

APPENDIX A Petition for Designation

Form WMA-PET1



STATE OF HAWAII
COMMISSION ON WATER RESOURCE MANAGEMENT
DEPARTMENT OF LAND AND NATURAL RESOURCES

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RESOURCE MANAGEMENT
DEPARTMENT OF LAND AND NATURAL RESOURCES

PETITION
FOR
WATER MANAGEMENT AREA ACTION

for

☒ Ground Water ☐ Surface Water

Instructions: Please print in ink or type and send completed petition with attachments to the Commission on Water Resource Management, P.O. Box 621, Honolulu, Hawaii 96809. For assistance, call the Regulation Branch at 587-0225.

1. PETITIONER

Firm/Name

Maui Meadows Homeowners Association

Contact Person

James Williamson, Vice Pres. PH: 874-6151

Address

P.O. Box 1935, Kihei, Maui, HI 96753

2. PROPOSED WATER MANAGEMENT AREA(S)

Island:

Maui

Aquifer Sector(s):

Aquifer System(s): Iao-North Waihee

Watershed(s):

West Maui mountains3. PROPOSED ACTION (Check one only): ☒ DESIGNATION ☐ MODIFICATION ☐ RESCINDMENT

4. JUSTIFICATION FOR PROPOSED ACTION ON WATER MANAGEMENT AREA(S)

Please attach a sheet to state reasons why the above hydrologic unit(s) under item 2 should be designated as a ground and/or surface water management area(s) or the boundaries of an existing water management area(s) modified or rescinded. If petition is for water management area designation, please state which criteria specified by 13-171-7 and/or 13-171-8, HAR, are met and why (see back of form). If petition is for modifying or rescinding existing water management area boundaries, please establish your standing to petition (13-171-10 HAR). Complete and detailed explanations are encouraged.

The attached letter dated 7/19/01 from James Williamson to Dorothy Williams, explains why our Association is requesting that the Iao Aquifer be designated as a water management area.

Submitted by (print)

Dorothy R. Williams

Title

President

Signature

Dorothy R. Williams

Date

7/11/01

**RELEVANT SECTIONS OF 13-171, HAR & 174C, HRS
REGARDING WATER MANAGEMENT AREA PETITIONS**

§13-171-3 Initiation by chairperson. The designation of a water management area by the commission may be initiated upon recommendation by the chairperson. In addition to this prerogative, it shall be the duty of the chairperson to make the recommendations from time to time when it is desirable or necessary to designate a water management area for the purposes stated in this chapter and there is data for a decision by the commission. [Eff. MAY 27 88] (Auth: HRS §174C-8) (Imp: HRS §§174C-5, 174C-41)

§13-171-4 Initiation by petition. (a) The designation of a water management area by the commission may also be initiated by any interested person by written petition to the chairperson proposing the designation of a specified area and presenting the reasons for such designation. The petition for designation of a water management area shall be made on forms provided by the commission. It shall be the duty of the chairperson, after consultation with the appropriate county mayor and county water board, to act upon the petition by making a recommendation for or against the proposed designation to the commission within sixty days after receipt of the petition or additional time as may be reasonably necessary to determine whether there is factual data to warrant the proposed designation.

(b) Designated ground water areas established under chapter 177, HRS, the Ground Water Use Act, and remaining in effect at the effective date of this chapter shall continue as water management areas. [Eff. MAY 27 88] (Auth: HRS §174C-8) (Imp: HRS §§174C-5, 174C-41)

§13-171-7 Ground water criteria for designation. In designating an area for ground water use regulation, the commission shall consider the following:

- (1) Whether an increase in water use or authorized planned use may cause the maximum rate of withdrawal from the ground water source to reach ninety percent of the sustainable yield of the proposed water management area;
- (2) That the rates, times, spatial patterns, or depths of existing withdrawals of ground water are endangering the stability or optimum development of the ground water body due to upconing or encroachment of salt water;
- (3) That the chloride contents of existing wells are increasing to levels which materially reduce the value of their existing uses;
- (4) Whether excessive preventable waste of water is occurring;
- (5) There is an actual or threatened water quality degradation as determined by the department of health;
- (6) Serious disputes respecting the use of ground water resources are occurring;
- (7) Whether regulation is necessary to preserve the diminishing ground water supply for future needs, as evidenced by excessively declining ground water levels; or
- (8) Whether water development projects that have received any federal, state, or county approval may result, in the opinion of the commission, in one of the above conditions.

Notwithstanding an imminent designation of a water management area conditioned on a rise in the rate of ground water withdrawal to a level of ninety percent of the area's sustainable yield, the commission, when such level reaches the eighty percent level of the sustainable yield, may invite the participation of water users in the affected area to an informational hearing for the purposes of assessing the ground water situation and devising mitigative measures. [Eff. MAY 27 88] (Auth: HRS §174C-8) (Imp: HRS §§174C-5, 174C-44)

§13-171-8 Surface water criteria for designation. In designating an area for surface water use regulation, the commission shall consider the following:

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- (2) Whether additions to or the diversions of stream waters are reducing the capacity of the stream to assimilate pollutants to an extent which adversely affects public health or existing instream uses; or
- (3) Whether serious disputes respecting the use of surface water resources are occurring.

[Eff. MAY 27 88] (Auth: HRS §174C-8) (Imp: HRS §§174C-5, 174C-45)

§13-171-10 Modifying and rescinding designated areas. The modification of the boundaries or the rescinding of existing water management areas by the commission may be initiated by the chairperson or by a petition to the commission by any person with proper standing. The procedure for modifying the boundaries of an existing water management area or for rescinding an existing water management area shall be as provided in subchapter 2 for the designation of a water management area. [Eff. MAY 27 88] (Auth: HRS §174C-8) (Imp: HRS §§174C-5, 174C-47)



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The attached letter dated 7/9/01 from James Williamson to Dorothy Williams, explains why our Association is requesting that the Iao Aquifer be designated as a water management area.

Submitted by (print) Dorothy R. Williams
Signature Dorothy R. Williams

Title President
Date 7/11/01

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Maui Meadows Homeowners Association

P.O. Box 1935, Kihei, Maui, HI 96753

Tel: (808) 874-6151

Fax: (808) 874-5305

July 9, 2001

Dorothy R. Williams, President

Subject: Designation of the Iao Aquifer

As you requested, I have prepared the following analysis which explains the reasons why the Maui Meadows Homeowners Association has decided to petition for designation of the Iao Aquifer system as a state water management area.

For some time now our Association has expressed its concern to the Maui county Water Department (Department) director, David Craddick, and also to the Board of Water Supply (Water Board), on the integrity of the Iao Aquifer (Aquifer) system which serves central and south Maui, including Paia. Our concern relates to the ability of the Aquifer to continue to supply sufficient and good quality potable water to our area. Most of the Water Board members agreed that the Aquifer needs to be supplemented by a new source but no action has been taken to achieve this goal. Director Craddick on the other hand states that there is no source problem, and that the situation can be resolved by spreading out pumping in new wells in the nearby North Waihee aquifer. We have come to believe that the concerns of the public can only be addressed by intervention of the state through the designation process.

Background

In July 1977, the Commission on Water Resource Management (Commission) considered designation of this Aquifer. It did not do so on the condition that the Department not pump any more than the estimated sustainable yield based on: "If additional wells are drilled at some distance (emphasis added) from the existing pumping center, and the pumpages are readjusted, Iao Aquifer may sustain 20 mgd." The Department has developed four new wells in the vicinity of North Waihee, two in 1977 and two last year, which can produce 4 to 4.5 mgd, and as a result has been able to reduce pumpage from the Iao Aquifer proper to about 17.5 mgd to meet the combined demand of 21.5 to 22 mgd.

The heading numbers below refer to those items enumerated on the petition application form under Section 13-171-7.

Items 1 and 2

Despite the reduction in pumpage from the Aquifer proper, the latest USGS data report for the first quarter of this year, is far from reassuring. It shows that the high water levels in the observation wells are either about the same or have fallen by as much as 1.21 ft.. Of equally as great a concern is that the altitude of the mid-point of the transition zone has risen by 2 ft. in 3 months. On an annual basis the salt level is rising some 8 ft..

Earlier this year the USGS issued two reports expressing its concern about the serious overdrafting of the Aquifer (the attached Exhibits A and B are copies of abstracts of these reports). One report questions whether the estimated sustainable yield of 20 mgd established in 1990, is too high. My simplified analysis derived as follows, also shows a lower sustainable yield. All the observation wells show water levels increasing to 1990, and then decreasing at a relatively uniform rate (see Exhibits C and D). The average pumping rate in 1990 was 16 to 17 mgd, which well maybe the range of the sustainable yield and not 20 mgd.

The North Waihee wells are within 1/2 to 1-1/4 miles from the estimated boundary of the Iao Aquifer, which is about 10 miles wide at this location. Hence it is easy to understand that, with no physical barrier, this "new" aquifer is really only an extension of the Iao Aquifer, and the total pumping of 21.5 to 22 mgd is being applied to the combined Iao and North Waihee system. So even a sustainable yield as high as 20 mgd is being exceeded by close to 10%. The result is that water levels continue to drop and the elevation of the transition zone rises. I agree with the USGS that spreading the pumping is only a short term solution because the local underground sources are interconnected. It won't change the ultimate consequence of destruction of the Aquifer unless the demand on it is reduced considerably by developing a completely separate source as soon as possible.

Item 3

The chloride concentrations of water pumped from the Waiehu Heights and Mokuahau group of wells, have been increasing for some years. The concentration has now reached 200 to 250 mg/L. However, other wells including North Waihee, have low chloride concentrations which have been relatively stable. Hence blending of these discharges results in an acceptable chloride concentration. This of course has to be viewed in the context of a steadily rising transition zone.

Item 6

The Central Maui Source Joint Venture agreement expired at the end of 1999. A controversial attempt to renew it, was made by a Water Board committee by agreeing, without public input, to increase the joint venture draw on the Aquifer by 3 to 4 mgd. In the face of a pending law suit the Water Board did not renew the agreement.

In the view of some county attorneys this matter may not be completely settled because of perceived commitments to the joint venture. There is a real question whether the Water Board has the authority to settle any such agreement, since all water in Hawaii is a public trust and the state is the trustee. The subject will no doubt be a significant issue in the permitting procedure for the Makena Resort development now before the county council. This project would use almost 2 mgd of potable water.

Item 7

The Department evidently recognizes that the Aquifer has not fully recovered. It states, however, that there is no source problem. In its review of permit applications for development, it has standard language that "no guarantee of water is granted or implied as a result of related comments". This statement is applied even if the developer has a water meter in hand. As stated previously, the Department maintains it can solve any problem with the Aquifer by spreading the pumping with an increased number of North Waihee wells, and has no interest in developing a completely independent source.

In the Department's view the overpumping is necessary as a result of a period of less than normal rainfall. However, the USGS data shows that at the highest elevation rainfall gage (Puu Kukui) the 12 month precipitation since 1998 is near the long term mean. I have verified this conclusion with data from the National Weather Service in Honolulu. Admittedly less than normal rainfall has prevailed for lower elevation gages, over the same period. But by far most of the contribution to the Aquifer comes from the higher elevations. Further, by definition the sustainable yield should be available during low rainfall periods.

A USGS Recent Hydrologic Conditions Report for Hawaii (updated June 26, 2001), shows water levels in Waiehu Test Hole B, to be at record lows for March, April and May. These are the lowest recorded levels for these months (since 1980). This follows similar reports for prior months. The previously mentioned Exhibits C and D, show the almost uniform decline in water levels in the Waiehu Deep Monitor well and Test Hole B, since 1990. The water level for Shaft 33 was 8.45 ft. on April 3, 2001, which is the lowest level since measurements resumed in 1996.

As stated above the North Waihee well field has been expanded in the hope that the Iao Aquifer would improve. It is not working since the new wells are too close to the Aquifer boundary, with obviously considerable interconnection, and probably because the estimated sustainable yield is too high. A relatively remote source has to be developed promptly to relieve overpumping of the Aquifer. On the other hand the Department's proposed CIP budget for next year provides for more of the same: development of the Kupaa wells, and exploration of the Maluhia wells. Both are in the North Waihee field and are relatively close to the Aquifer boundary.

At a hearing on the Water Board's budget, I recommended that exploratory wells be drilled at locations well on the way to Kahakuloa, to remove or at least considerably reduce their influence on the Aquifer. If the north trending inferred dike is close to the Kahakuloa road, the best location for these wells could be mauka of the dike, to further isolate them from the existing well field for the Iao Aquifer. The budget should be used for this purpose instead of further expanding the North Waihee system. To develop this new source including transmission facilities, it will probably be necessary to float a new bond issue for financing.

A final long range plan should involve hydrological modeling, not only of the Kahakuloa plan but also covering other prospective sources to serve central and south Maui.

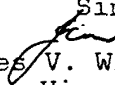
Item 8

Many housing and commercial projects have been approved, or are in the permit review stage, for which a firm potable water source is not available. The Department's consistent statement about not being able to guarantee water availability is apparently designed to avoid liability, but is I believe misleading and even dishonest. The Water Board has handed out water meters to hundreds of new homes and developments in Kihei - Wailea - Makena, which for 20 years now has been the fastest growing part of the state. I seriously wonder if the Department is able to document how many water meters are outstanding and how much water is represented by them. At the same time the county planning department/planning commission, continue to approve development in south Maui without any inkling of the availability of water and the impact on those of us who already live here. We are in a crisis: the Aquifer levels are dropping, while promises for more development than the system can handle have already been made.

The conclusion from all of this is that there is absolutely a water supply source problem. Spreading the pumping is advisable but it won't change the ultimate impact on the Aquifer unless new wells are developed promptly to reduce the Aquifer pumpage, and which are adequately separated from it. It has been said that the Water Department is living on the float - depending on the lag time it takes for salt water to intrude into to the fresh water lens where the wells are located. For example Wailuku Shaft, a major contributor, has a safe water level of 11 ft. and it is now measured at 8.5 ft.. Once salt water intrusion occurs it is irreversible! We will have lost the principal source of water supply for central and south Maui. It would be a complete disaster, far worse than the upcountry situation.

If you have any questions please ask.

Sincerely,


James V. Williamson, P.E.
Vice-President



The Response of the Iao Aquifer to Ground-Water Development, Rainfall, and Land-Use Practices Between 1940 and 1998, Island of Maui, Hawaii

By William Meyer and Todd K. Presley

The complete report is available as an Adobe Acrobat (.pdf) file (2,226 Kb).

The complete report requires Adobe Acrobat Reader (free) to be viewed.



Abstract

Ground water pumped from the Iao aquifer has been used for agricultural purposes since 1948, and domestic purposes since 1955. In 1990, the Hawaii State Commission on Water Resource Management established a value of 20 million gallons per day for the sustainable yield of the aquifer. Water-level data from observation wells throughout the aquifer and information on the depth to and thickness of the transition zone between freshwater and saltwater at the Waiehu deep monitor well indicate that pumping rates near the sustainable yield value of 20 million gallons per day could result in salt-water intrusion in some pumped wells.

Since the introduction of pumpage in 1948 and the reduction of recharge in 1980, water levels have declined, chloride concentrations of the pumped water have increased, and the transition zone between freshwater and saltwater has risen. Water levels declined by about 18 feet between 1940 and 1998 in the area near Iao Stream, and by as much as 6 feet between 1977 and 1997 in the vicinity of the major well fields near Waiehu Stream. Chloride concentrations of pumped water have risen at all the well fields, but are presently below the U.S. Environmental Protection Agency recommended standard of 250 milligrams per liter. The chloride concentration of water pumped from Mokuauia 2, however, was 460 milligrams per liter in late 1996 when pumping was halted at this well. The midpoint of the transition zone, as measured at the Waiehu deep monitor well, rose by about 108 feet between 1985 and 1998.

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 - Irrigation Ditches

The Response of the Iao Aquifer to Ground-Water Development, Rainfall, and Land-Use Practices Between 1940 and 1998, Island of Maui, Hawaii

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- Ground-Water Development
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 - Water-Level Changes Since the Introduction of Pumping
 - Water-Level Changes Relative to Rainfall
 - Movement of the Freshwater/Saltwater Transition Zone
 - Changes in the Chloride Concentration of Pumped Water
- Sustainable Yield
- Summary and Conclusions
- References Cited

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Abstract from: Meyer, William, and Presley, T.K., 2001, The Response of the Iao Aquifer to Ground-Water Development, Rainfall, and Land-Use Practices Between 1940 and 1998, Island of Maui, Hawaii: U.S. Geological Survey Water-Resources Investigations Report 00-4223, 60 p.

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Water Resources of Hawaii & the Pacific

Analytical Versus Numerical Estimates of Water-Level Declines Caused by Pumping, and a Case Study of the Iao Aquifer, Maui, Hawaii

By Delwyn S. Oki and William Meyer

The complete report is available as an Adobe Acrobat (.pdf) file (587 Kb).

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Abstract

Comparisons were made between model-calculated water levels from a one-dimensional analytical model referred to as RAM (Robust Analytical Model) and those from numerical ground-water flow models using a sharp-interface model code. RAM incorporates the horizontal-flow assumption and the Ghyben-Herzberg relation to represent flow in a one-dimensional unconfined aquifer that contains a body of freshwater floating on denser saltwater. RAM does not account for the presence of a low-permeability coastal confining unit (caprock), which impedes the discharge of fresh ground water from the aquifer to the ocean, nor for the spatial distribution of ground-water withdrawals from wells, which is significant because water-level declines are greatest in the vicinity of withdrawal wells. Numerical ground-water flow models can readily account for discharge through a coastal confining unit and for the spatial distribution of ground-water withdrawals from wells.

For a given aquifer hydraulic-conductivity value, recharge rate, and withdrawal rate, model-calculated steady-state water-level declines from RAM can be significantly less than those from numerical ground-water flow models. The differences between model-calculated water-level declines from RAM and those from numerical models are partly dependent on the hydraulic properties of the aquifer system and the spatial distribution of ground-water withdrawals from wells. RAM invariably predicts the greatest water-level declines at the inland extent of the aquifer where the freshwater body is thickest and the potential for saltwater intrusion is lowest. For cases in which a low-permeability confining unit overlies the aquifer near the coast, however, water-level declines calculated from numerical models may exceed those from RAM even at the inland extent of the aquifer.

Since 1990, RAM has been used by the State of Hawaii Commission on Water Resource Management for establishing sustainable-yield values for the State's aquifers. Data from the Iao aquifer, which lies on the northeastern flank of the West Maui Volcano and which is confined near the coast by caprock, are now available to evaluate the predictive capability of RAM for this system. In 1995 and 1996, withdrawal from the Iao aquifer reached the 20 million gallon per day sustainable-yield value derived using RAM. However, even before 1996, water levels in the aquifer had declined significantly below those predicted by RAM, and continued to decline in 1997. To halt the decline of water levels and to preclude the intrusion of salt-water into the four major well fields in the aquifer, it was necessary to reduce withdrawal from the aquifer system below the sustainable-yield value derived using RAM.

In the Iao aquifer, the decline of measured water levels below those predicted by RAM is consistent with the results of the numerical model analysis. Relative to model-calculated water-level declines from numerical ground-water flow models, (1) RAM underestimates water-level declines in areas where a low-permeability confining unit exists, and (2) RAM underestimates water-level declines in the vicinity of withdrawal wells.

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 - Ground-Water Withdrawals
- Comparisons Between RAM and Two-Dimensional Numerical Models
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- Appendix: Description of RAM
 - Dupuit Assumption
 - Ghyben-Herzberg Relation
 - One-Dimensional Analytical Equation

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WAIEHU DEE MONITOR WELL

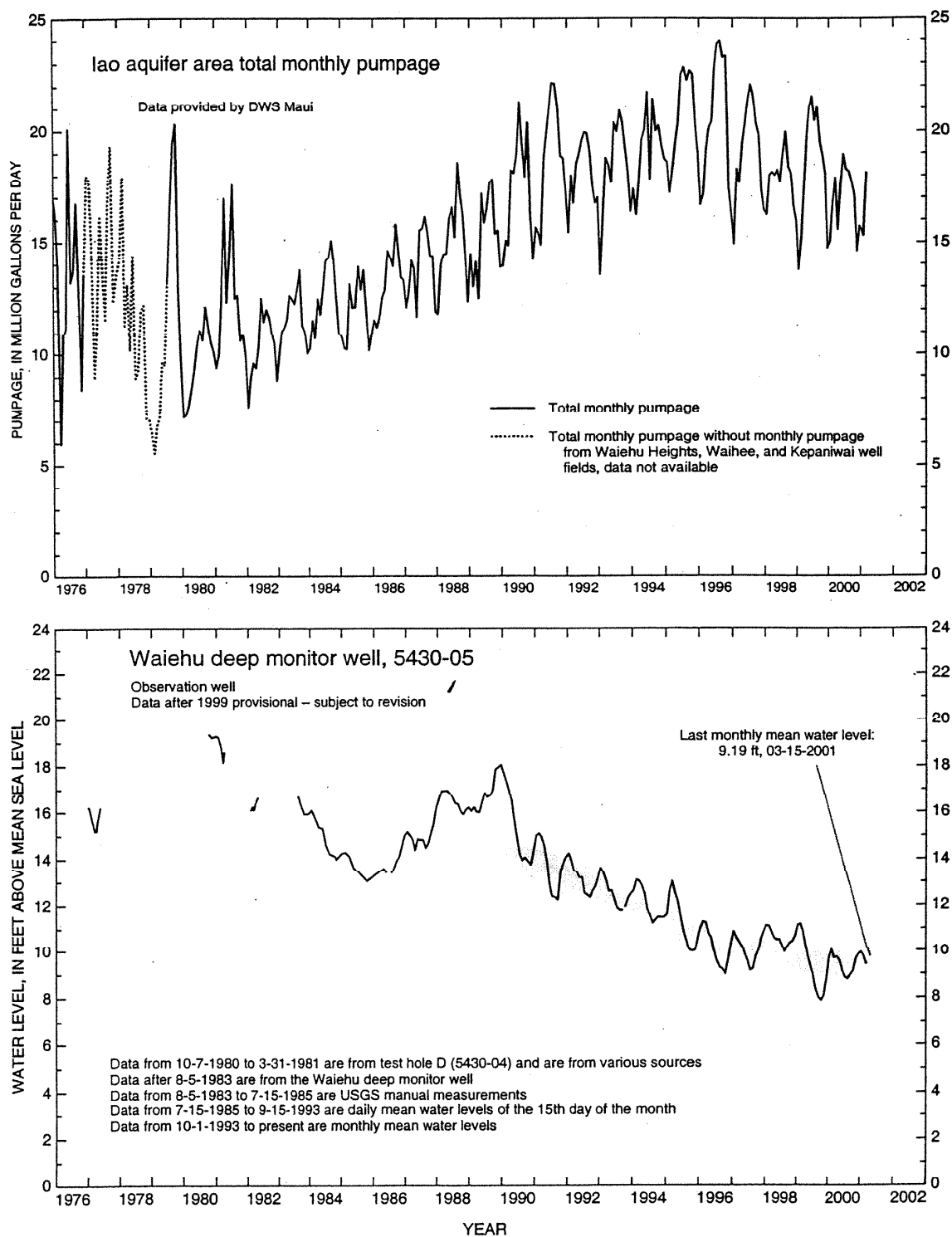


Figure 8

TEST HOLE B

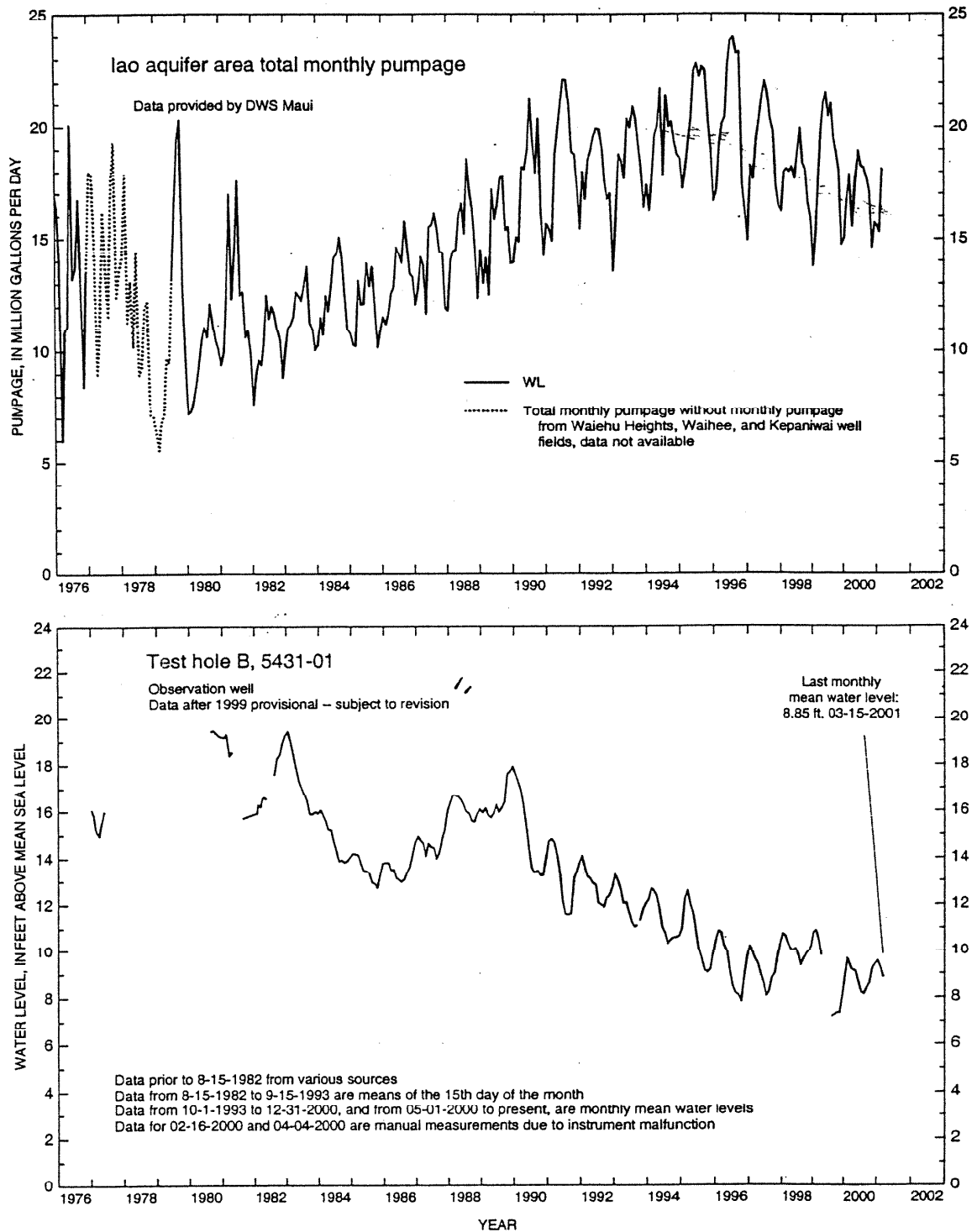


Figure 9